Amendments to the Specification:

Please replace the paragraph bridging pages 3 and 4 with the following amended paragraph:

The modulation system (APCO P25 Phase 1 modulation system, hereinafter "P25-P1 modulation system"), which was examined as the Project 25 in the APCO (Association of Public Safety Communications Officials) and, then, enacted as the standard (TIA102) by the TIA (Telecommunications Industry Association) is also used as a modulation system of the LMR system applicable to the channel spacing of 12.5 kHz. This modulation system is a system for transmitting a digital signal of a base band according to ~~quaternary~~ four-level FSK modulation. A transmission rate, a symbol rate, a base band filter, and a nominal frequency shift of the modulation system are as shown in Table 3 below.

Please replace the table beginning at page 4, line 11, with the following amended table:

Table 3

Transfer Rate	9600 bps
Symbol Rate	4800 symbol/s
Base Band Filter	Transmission: A filter obtained by combining a filter having a Raised Cosine characteristic with α=0.2 and a shaping filter Reception: An integrate and dump filter
Modulation System	~~Quaternary~~ Four-Level FSK Modulation

Nominal Frequency Shift	Shifts of +3=+1.8 kHz, +1=+0.6 kHz, -1 = -0.6 kHz, and -3=-1.8 kHz for respective four symbol levels (±3, ±1)

Please replace the paragraph beginning at page 18, line 6, with the following amended paragraph:

Thus, in the embodiments described below, parameters such as a transmission rate and a frequency shift that can realize an LMR system conforming to the FCC rule to be enforced in 2005 by adopting a nonlinear modulation system represented by a ~~quaternary~~ four-level FSK modulation system will be examined.

Please replace the paragraph bridging pages 18 and 19 with the following amended paragraph:

Correlation between the emission spectrum shown in Figure 2 and the Bessel function indicated by Expression (1) is calculated. Since a modulation frequency is 2.5 kHz and a frequency shift is a 2.5 kHz shift, the modulation index mf is 1. When primary to ~~quaternary~~ four-level components are calculated according to the Bessel function, the following levels are obtained.

(Primary) = J1(1) = -7.13 dB

(Secondary) = J2(1) = -18.79 dB

(Third-order) = J3(1) = -34.17 dB

(Fourth-order) = J4(1) = -52.12 dB

Please replace the paragraph beginning at page 20, line 5, with the following amended paragraph:

A condition under which the LMR system adopting the ~~quaternary~~ four-level FSK modulation system conforms to the FCC rule to be enforced in 2005 will be explained.

Please replace the paragraph beginning at page 20, line 8, with the following amended paragraph:

In Figures 3 and 4, an emission spectrum in the case in which the P25-P1 modulation system is adopted is shown. In the case of digital modulation, a spectrum of a modulation wave is different depending on a characteristic of a data sequence used. As is evident from Figures 3 and 4, if random data is used, the spectrum disperses and average energy per unit frequency decreases. Thus, the spectrum is seemingly narrowed. In repetition of specific data, an emission spectrum is equivalent to a spectrum subjected to modulation with a sine wave. Since energy concentrates on components integer times as large as the sine wave, a wide spectrum is obtained. Therefore, a worst condition in the ~~quaternary~~ four-level FSK modulation is a condition at the time when symbols of +3 and -3 with a wider frequency shift are used and the symbols are alternately repeated to subject an emission spectrum to modulation with a sine wave equal to a frequency half as high as a symbol rate.

Please replace the paragraph bridging pages 20 and 21 with the following amended paragraph:

As described above, the FCC rule to be enforced in 2005 provides, as a condition, that an emission spectrum be adapted to the mask E and that, in performing transmission of data, an LMR system have a transmission rate equal to or higher than 4800 bps per 6.25 kHz band. Thus, a frequency shift for adapting an emission spectrum to the mask E at the time when the ~~quaternary~~ four-level FSK modulation system is used at a transmission rate of 4800 bps is calculated backward. In this case,

since a symbol rate is 2400 symbol/s that is half the transmission rate of 4800 bps. Thus, by repeating symbols of +3 and -3, an emission spectrum is equivalently a sine wave of 1.2 kHz.

Please replace the paragraph bridging pages 25 and 26 with the following amended paragraph:

In the above explanation, a maximum frequency shift for adapting an emission spectrum to the mask E at the time when the ~~quaternary~~ four-level FSK is used at the transmission rate of 4800 bps is calculated. When digital data is modulated, it is a well-known fact that a waveform is shaped using a base band filter. An error rate is affected by a base band filter used. As indicated by Expression (3), an actual frequency shift outputted from a modulator changes depending on a base band filter. Thus, nominal frequency shifts at the symbol levels of +3 and -3 obtained by calculating backward the maximum frequency shift 0.952 kHz indicated by Expression (4) are different.

Please replace the paragraph beginning at page 26, line 13, with the following amended paragraph:

It is a general practice to use a Nyquist transmission path as a transmission path in order to hold down an error rate. Therefore, in this embodiment, a Nyquist filter is used in a base band [[filer]] filter. An FM modulator and an FM demodulator have transparency as long as distortion does not occur. Thus, in order to form a Nyquist transmission path, the Nyquist filter only has to be arranged at a pre-stage of the FM modulator or a post stage of the FM demodulator such that the base band filter has a Nyquist characteristic. Since the shaping filter and the integrate and dump filter described in Table 3 have opposite frequency characteristics, it can be understood that,

if the modulator and the demodulator are integrated, only the raised cosine filter is left and that the Nyquist transmission path is formed.

Please replace the table bridging pages 31 and 32 with the following amended table:

Table 9

Transmission Rate	4800 bps
Symbol Rate	2400 symbol/s
Base Band Filter	Transmission: A filter obtained by combining a filter having a Root Raised Cosine characteristic with an arbitrary α and a filter having a sinc function characteristic Reception: A filter obtained by combining a filter having a Root Raised Cosine characteristic with an arbitrary α and a filter having a 1/sinc function characteristic
Modulation System	~~Quaternary~~ <u>Four-Level</u> FSK Modulation System
Nominal Frequency Shift	Arbitrary in ranges +3=+913 Hz to +1057 Hz and -3=-913 Hz to -1057 Hz with respect to respective four symbol levels (±3, ±1) +1 and -1 are shifts 1/3 of +3 and -3, respectively

Please replace the paragraph beginning at page 33, line 10, with the following amended paragraph:

The mapper 12 sequentially converts a binary signal sequentially inputted from the encoder 11 into ~~quaternary~~ <u>four-level</u> symbols (±3, ±1) two bits at a time and supplies the ~~quaternary~~ <u>four-level</u> symbols to the base band filter 13. This symbol is a rectangular voltage signal having a width of a predetermined symbol time. In this

embodiment, since a transmission rate is 4800 bps, a symbol rate is 2400 symbol/s and a frequency of a symbol sequence at the time when symbols of +3 and -3 are alternately outputted from the mapper 12 is 1.2 kHz.

Please replace the paragraph beginning at page 35, line 4, with the following amended paragraph:

The FM demodulator 21 demodulates a signal inputted and received via a not-shown antenna and supplies a ~~quaternary~~ four-level signal obtained by demodulating the signal to the base band filter 22.

Please replace the paragraph beginning at page 35, line 8, with the following amended paragraph:

The base band filter 22 includes a root raised cosine filter 131 and a 1/sinc filter 231 having a characteristic opposite to that of the sinc filter 132. The base band filter 22 blocks a predetermined frequency component of a ~~quaternary~~ four-level signal inputted from the FM demodulator 21 and outputs a ~~quaternary~~ four-level signal having an amplitude $\pi / 2\sqrt{2}$ times as large as that of the input signal.

Please replace the paragraph beginning at page 35, line 20, with the following amended paragraph:

The demapper 23 sequentially converts a ~~quaternary~~ four-level signal inputted from the base band filter 22 into a binary signal of 2 bits and supplies the binary signal converted to the decoder 24.

Please replace the paragraph beginning at page 36, line 12, with the following amended paragraph:

The mapper 12 applies mapping processing to the binary signal inputted from the encoder 11 to sequentially convert the binary signal into ~~quaternary~~ four-level symbols two bits at a time and outputs the symbols converted to the base band filter 13 (step S102).

Please replace the paragraph bridging pages 36 and 37 with the following amended paragraph:

The FM demodulator 21 of the receiving unit 20 applies FM demodulation processing to the signal inputted via the not-shown antenna and received and outputs a ~~quaternary~~ four-level signal obtained by demodulating the signal to the base band filter 22 (step S201).

Please replace the paragraph beginning at page 37, line 5, with the following amended paragraph:

The base band filter 22 applies band limitation processing to the ~~quaternary~~ four-level signal inputted from the FM demodulator 21 and outputs the ~~quaternary~~ four-level signal with a predetermined frequency component blocked to the demapper 23 (step S202).

Please replace the paragraph beginning at page 37, line 10, with the following paragraph:

The demapper 23 applies demapping processing to the ~~quaternary~~ four-level signal inputted from the base band filter 22, converts the ~~quaternary~~ four-level signal into a binary signal of 2 bits, and outputs the binary signal converted to the decoder 24 (step S203).

Please replace the table beginning at page 38, line 6, with the following amended table:

Table 10

Transmission Rate	4800 bps
Symbol Rate	2400 symbol/s
Base Band Filter	Transmission: A filter having a Root Raised Cosine characteristic with an arbitrary α Reception: A filter having a Root Raised Cosine characteristic with an arbitrary α
Modulation System	~~Quaternary~~ Four-Level FSK Modulation System
Nominal Frequency Shift	Arbitrary in ranges +3=+581 Hz to +673 Hz and -3=-581 Hz to -673 Hz with respect to respective four symbol levels (±3, ±1) +1 and -1 are shifts 1/3 of +3 and -3, respectively

Please replace the paragraph beginning at page 39, line 10, with the following amended paragraph:

The receiving unit 40 includes the FM demodulator 21, a base band filter 42, the demapper 23, and the decoder 24. The base band filter 42 includes a root raised cosine filter 131. The base band filter 42 blocks a predetermined frequency component of a ~~quaternary~~ four-level signal inputted from the FM demodulator 21 and outputs a

~~quaternary~~ four-level signal having an amplitude $\sqrt{2}$ times as large as that of the input signal.

Please replace the paragraph beginning at page 40, line 19, with the following amended paragraph:

According to the above description, the ~~quaternary~~ four-level FSK modulation system is applied to the LMR system in this embodiment. Thus, it is possible to directly apply a nonlinear power amplifier and an FM modulation and demodulation circuit of a radio apparatus of analog FM modulation presently operated in the LMR system applicable to the 12.5 kHz channel spacing to the LMR system in this embodiment. Therefore, the LMR system in this embodiment can conform to the FCC rule to be enforced in 2005 without using a linear power amplifier having a problem in terms of cost.

Please replace the paragraph beginning at page 41, line 16, with the following amended paragraph:

In order to keep downward compatibility, a radio apparatus actually used is required to also implement an operation mode of analog FM modulation used in the LMR system applicable to the 12.5 kHz channel spacing. However, in the LMR system in this embodiment, since the ~~quaternary~~ four-level FSK modulation system having compatibility with a large number of circuits is adopted, dual mode design is possible. Moreover, the P25-P1 modulation system is based on the ~~quaternary~~ four-level FSK modulation system, although there is a difference in parameters. Thus, dual mode design in combination with the P25-P1 modulation system is also possible.

Please replace the table beginning at page 42, line 14, with the following amended table:

Table 11

Transmission Rate	4800 bps
Symbol Rate	2400 symbol/s
Base Band Filter	Transmission: A filter obtained by combining a filter having a Raised Cosine characteristic with an arbitrary α and a [[filer]] filter having a 1/sinc function characteristic Reception: A filter having a sinc function characteristic
Modulation System	~~Quaternary~~ Four-Level FSK Modulation System
Nominal Frequency Shift	Arbitrary in ranges of +3=+523 Hz to +606 Hz and -3=-523 Hz to -606 Hz with respect to respective four symbol levels (±3, ±1) +1 and -1 are shifts 1/3 of +3 and -3, respectively

Please replace the paragraph beginning at page 43, line 21, with the following amended paragraph:

The receiving unit 60 includes the FM demodulator 21, a base band filter 62, the demapper 23, and the decoder 24. The base band filter 62 includes a sinc filter 132 having a characteristic opposite to that of the 1/sinc filter 231. The base band filter 62 blocks a predetermined frequency component of a ~~quaternary~~ four-level signal inputted from the FM demodulator 21 and outputs a ~~quaternary~~ four-level signal having an amplitude 2/π times as large as that of the input signal.

Please replace the paragraph bridging pages 44 and 45, with the following amended paragraph:

In the embodiments, the ~~quaternary~~ four-level FSK modulation system is adopted as a multi-value FSK modulation system. However, the invention is not limited to this. An octonary FSK modulation system, a hexadecimal FSK modulation system, and the like may be adopted. For example, when the octonary FSK modulation system is used, since a symbol rate is fixed at 2400 symbol/s, a transmission rate is 7200 bps. A symbol level takes eight values of ±7, ±5, ±3, and ±1. When symbols of +7 and -7 are alternately sent, a sine wave of 1.2 kHz is formed. Therefore, if actual frequency shifts in the symbols of +7 and -7 are set to, for example, the values defined in the first and second embodiments, the modification and the like, it is possible to adapt an emission spectrum to the mask E as in the case in which a symbol level takes four values. By adopting such a condition, it is possible to obtain a higher transmission rate by using, other than the octonary FSK modulation system, the hexadecimal FSK modulation system or an FSK modulation system of a larger value while adapting an emission spectrum to the mask E.

Please replace page 53 of the original specification with the attached replacement abstract. The replacement abstract is provided on a separate sheet per 37 CFR § 1.72.